

## Two new nocturnal species of the genus *Anatolica* (Coleoptera: Tenebrionidae: Pimeliinae) from the deserts of northwest China

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**Abstract:** Two new species of the genus *Anatolica* Eschscholtz, 1831, *A. badainica* Ba, Ren & Liu sp. nov. and *A. gurbantunggutica* Ba & Ren sp. nov., are reported from the deserts of northwest China. Both are described and illustrated. The circadian rhythms of these two new species are briefly discussed.

**Key words:** darkling beetles; circadian rhythm; taxonomy; desert

中国西北沙漠夜间活动的东鳌甲属昆虫二新种（鞘翅目：拟步甲科：漠甲亚科）

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**摘要:** 文章描述中国西北地区东鳌甲属 2 新种: 巴丹东鳌甲 *A. badainica* Ba, Ren & Liu sp. nov. 和古尔班东鳌甲 *A. gurbantunggutica* Ba & Ren sp. nov., 提供其主要鉴别特征和形态图, 并简要讨论其昼夜活动规律。

**关键词:** 拟步甲; 昼夜节律; 分类; 沙漠

### Introduction

The genus *Anatolica*, with more than 90 described species, was established by Eschscholtz in 1831, according to the following characteristics: eyes oval, pronotum slightly wide, protarsomere I normal, metafemora not reaching to apex of abdomen, shoulders of elytra more or less angular, and distributed in Russia, Eastern Siberia, Kazakhstan, Mongolia and Northern China. In general view, the species of this genus are diurnal (Crowford 1981), but some nocturnal species were reported (Pfeiffer and Bayannasan 2012).

The early taxonomic research on the genus *Anatolica* Eschscholtz, 1831 from the deserts of northwest China and the adjacent regions were conducted mainly by Fischer von Waldheim (1844), Kraatz (1885), Fairmaire (1886), Frivaldszky (1889), Schuster (1937) and Reitter

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(1887, 1889, 1896, 1897, 1900), and others. Later, the most important investigations into zoogeographical distribution of the genus *Anatolica* of China and the adjacent regions were made by Kaszab (1965, 1967, 1968, 1976) in Mongolia, Kaszab and Knor (1976) in East Siberia, Chigray and Nabozhenko (2017) in the Don River sands, Ren and Yu (1999) in desert and semi-desert regions of China, and Ren and Ba (2009) in China.

While investigating the diversity of surface beetle species in Gansu and Inner Mongolia of China, we found a highly peculiar species of the genus *Anatolica* in the Badain Jaran Desert, which in our opinion is a new species. Then, we found another new species, which should belong to the genus *Anatolica*, deposited in the Museum of Hebei University (MHBU), having been collected from the Gurbantunggut Desert several times by Qiaozhe LOU (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences), and Yibin BA, Chengli ZHANG and Chunlin LIU (Hebei University). Their descriptions are provided in this paper.

## Material and methods

Figures of morphological details were drawn by hand, using a Nikon SMZ1500 stereomicroscope equipped with a camera lucida. Habitus were taken with a Canon EOS 5D Mark III camera connected to a Canon MP-E 65 mm macro lens. The type specimens examined are deposited in the Museum of Hebei University, Baoding, China (MHBU).

## Taxonomy

### 1. *Anatolica badainica* Ba, Ren & Liu sp. nov. (Figs 1, 3A)

Description. Body very elongate-oval, black and slightly brown, shiny.

Head trigeminal. Clypeus trapezoidal, with horizontal thin-wrinkles, anterior margin straight, deeply concave between clypeus and genae. Genae curved and narrowed forward. Dorsum flat, sparsely with fine punctures, its diameter smaller than space between punctures. Eyes transversely oval. Eye pleats slightly protruding in front. Labrum brown, sparsely punctate, anterior margin concave, in middle with a row of setae. Most of mandibles visible in dorsal view. Mentum approximately pentagonal, densely punctate, anterior margin triangle deeply concave. Antennae slender, apical four antennomeres serrated and extending beyond base of pronotum, antennomere XI oval, VIII–X somewhat triangular; relative length ratio of II–XI as follows: 17.5 : 52.4 : 37.0 : 36.0 : 32.4 : 30.5 : 26.8 : 20.4 : 17.4 : 24.8.

Pronotum approximately square, 1.05 times as long as wide, widest at apical one-quarter. Anterior margin somewhat straight, only bordered on sides; lateral margins slightly arcuate, with thin border; base arcuate, thinly bordered. Anterior angles approximately rectangular, posterior ones obtuse. Disc transversely convex; sparsely covered with fine punctures, space between punctures approximately 4.0–6.0 times its diameter. Hypomeron nearly smooth, with sparse punctures. Apex of prosternal process deflexed behind basal fossa, then extending rearward.

Elytra elongate-oval, 1.75 times as long as wide, 1.37 times width of pronotum. Base concaved arc-shaped, bordered only on sides and unjointed with lateral edge. Shoulders arched. Dorsum weakly arcuate, punctures similar to those on pronotum but denser, approximately

equal with its spacing, somewhat jointed. Scutellum slender linguiform.

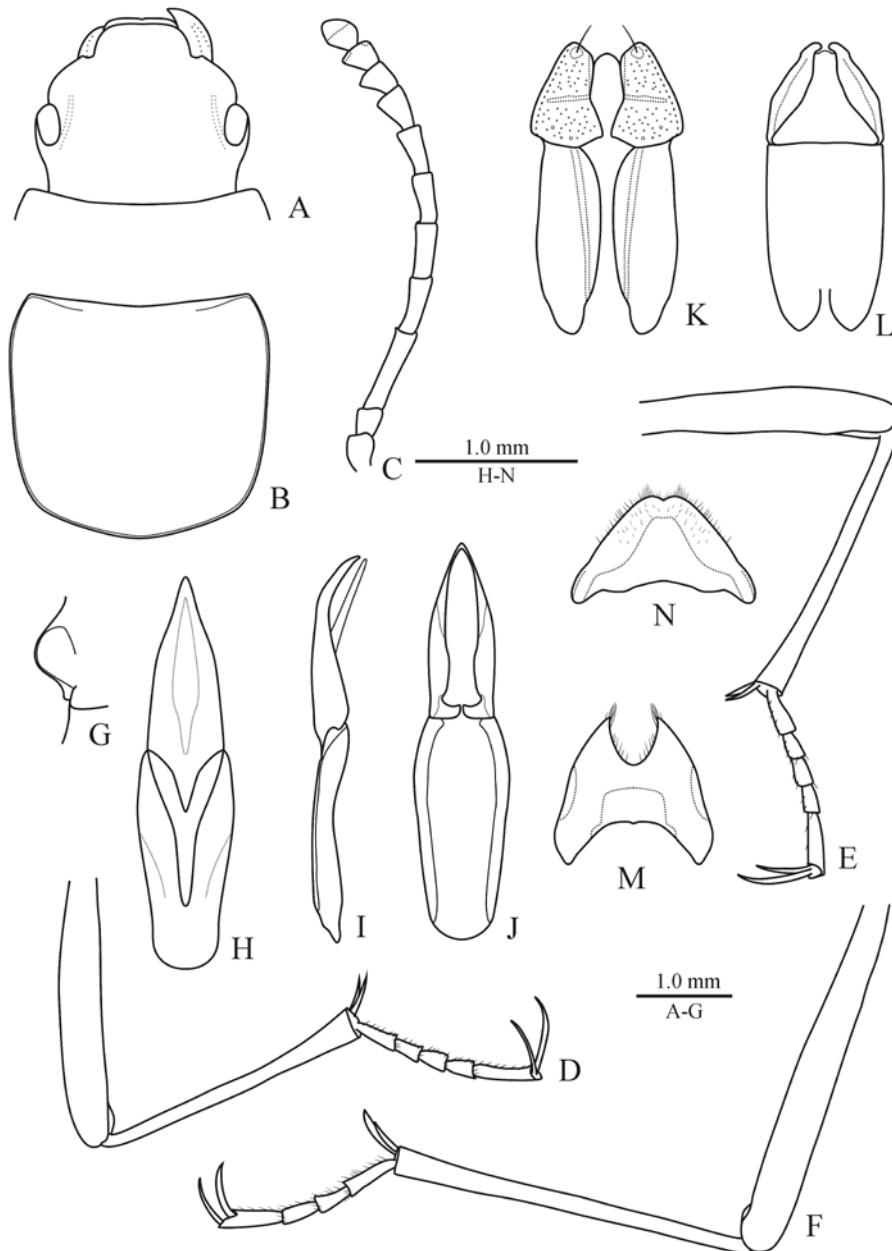


Figure 1. *Anatolica badainica* Ba, Ren & Liu sp. nov. A. Head; B. Pronotum; C. Antenna; D-F. Pro-, meso- and metaleg; G. Prosternal process, lateral view; H-J. Aedeagus, dorsal, lateral and ventral views; K, L. Ovipositor, ventral and dorsal views; M, N. Sternite VIII, male and female.

Legs long and thin, claws very long. Femora slightly rod-like; tibiae suddenly incrassate apically. Protibiae somewhat incurved in middle, others straight. Apical spurs long, its length

equal to basal two protarsomeres in protibiae, reaching middle of mesotarsomere II in mesotibiae, and equal with metatarsomere I in metatibiae. Ratio of relative length of metatarsomeres I–IV as follows: 34.67 : 22.52 : 23.27 : 39.87.

Abdomen sparsely covered with shallow round punctures, its diameter much less than spacing between punctures.

Aedeagus short and broad. Parameres of aedeagus broader, length approximately equal with phallobase, longitudinal mid-depression shallow on dorsum; lateral margins gradually becoming narrower to apex; apex sharp. Lateral margins of phallobase approximately parallel, apex round. Ovipositor stout, apex of dorsum with a long seta; valvula approximately digitate.

Measurements. Body length 10.0–13.5 mm; width 3.5–5.0 mm.

**Holotype.** ♂, **China**, Gansu, Linze County, Pingchuan Town, Jiliang LIU, Hebei University Museum (white, rectangular, printed). **Paratypes.** 2♂2♀, 10-IX-2014, **China**, Gansu, Linze County, Qingshanpo of Pingchuan Town, Jiliang LIU, same data as the holotype; 1♂, V-2014, **China**, Gansu, Linze County, Pingchuan Town, Jiliang LIU, same data as the holotype; 3♂2♀, same label data as holotype; 8♂6♀, **China**, Inner Mongolia, the desert of Alxa Zuoqi, Yibin BA, same data as the holotype. All types have additional labels “Holotypus (or Parotypus, respectively), *Anatolica badainica* sp. n. Ba, Ren & Liu det. 2019” (red and yellow, rectangular, printed and handwritten).

**Etymology.** Named after the type locality, the Badain Jaran Desert.

**Diagnosis.** This species can be distinguished from *Anatolica mustacea* Kolbe, 1908 as follows: antennae slender and extending beyond base of pronotum; the punctures of pronotum sparser and finer; the border of elytral base not reaching scutellum.

## 2. *Anatolica gurbantunggutica* Ba & Ren sp. nov. (Figs 2, 3B)

**Description.** Body elongate-oval, black and shining.

Head trigeminal. Clypeus trapezoidal, anterior margin straight; round punctures dense forward and gradually sparser backwards; obtusely concave between clypeus and genae, with slender scar. Genae weakly curved, straightly narrowed forward. Temple strongly narrowed backward. Dorsum flat, sparsely covered with fine punctures, space between punctures approximately 2–4 times its diameter. Eyes large and slightly raised, reniform, strongly convex outward, length approximately one-third head. Eye pleats weak. Labrum brown, with shallow wrinkles and brown setae; anterior margin weakly concave, densely covered with brown setae. Mentum approximately pentagonal, sparsely with shallow thin punctures, anterior margin triangular concave. Antennae slender, apical four antennomeres serrated, antennomere IX–XI extending beyond base of pronotum, antennomere XI oval, VIII–X somewhat triangular; relative length ratios of II–XI as follows: 12.6 : 18.3 : 13.2 : 12.8 : 11.8 : 11.0 : 10.4 : 8.5 : 7.3 : 10.0.

Pronotum approximately square, 1.06 times as long as wide, widest at apical one-third. Anterior margin somewhat concave, only bordered on sides; lateral margins weakly arched, finely bordered; base straight on sides, and arched protruding backward in middle; fine border slightly weak in middle. Anterior angles rectangular, posterior ones somewhat obtuse. Disc transversely convex; smooth, sparsely covered with fine punctures, space between punctures approximately 4–6 times its diameter; middle longitudinal impression weak. Hypomeron with large punctures on middle, and punctures gradually sparser and smaller to sides. Apex of

prosternal process deflexed behind basal fossa, then extending backward.

Elytra elongate-oval, 1.70 times long as wide, 1.40 times width of pronotum. Base straight, bordered only on sides. Shoulders arched. Dorsum convex, punctated densely, space between punctures somewhat equal to its diameter. Scutellum slender linguiform.

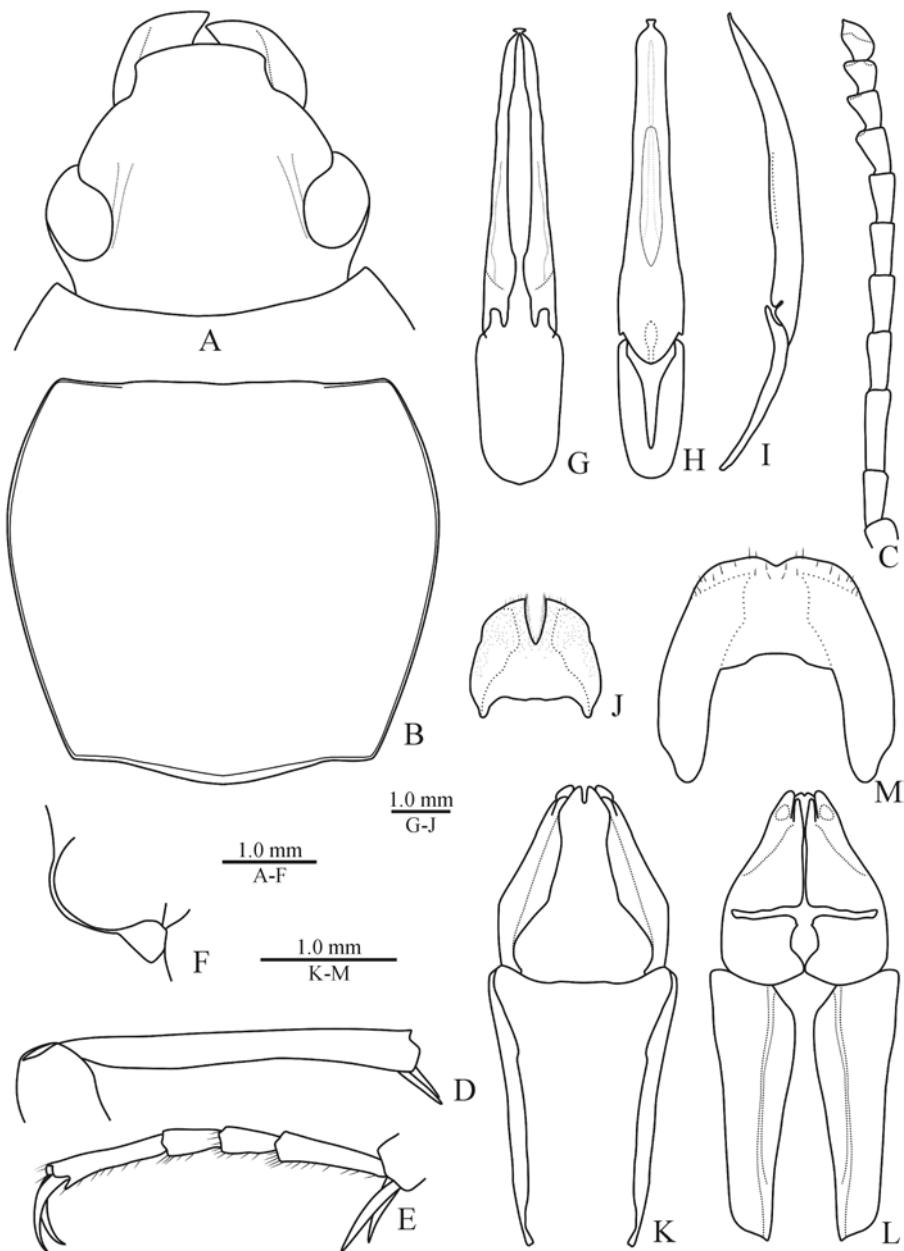


Figure 2. *Anatolica gurbantunggutica* Ba & Ren sp. nov. A. Head; B. Pronotum; C. Antenna; D. Protibia; E. Metatarsus; F. Prosternal process, lateral view; G–I. Aedeagus, ventral, dorsal and lateral views; J. Sternite VIII, male; K, L. Ovipositor, ventral and dorsal views; M. Sternite VIII, female.

Legs long and thin. Interior of protibiae concave on middle, suddenly incrassate on apex; meso- and metatibiae straight, suddenly incrassate on apex. Apical spurs and claws long. Ratios of relative length of metatarsomeres I-IV as follows: 25.3 : 12.7 : 13.2 : 27.2.

Abdomen sparsely covered with shallow round punctures.

Aedeagus slightly arcuate toward segmental venter. Parameres of aedeagus long, 2.2 times phallobase length, shallow with longitudinal mid-depression on middle of dorsum; lateral margins gradually becoming narrower to apex, and weakly double curved; apex small inverted triangle. Lateral margins of phallobase slightly narrowing to the end, apex round. Ovipositor stout, valvula approximately triangular.

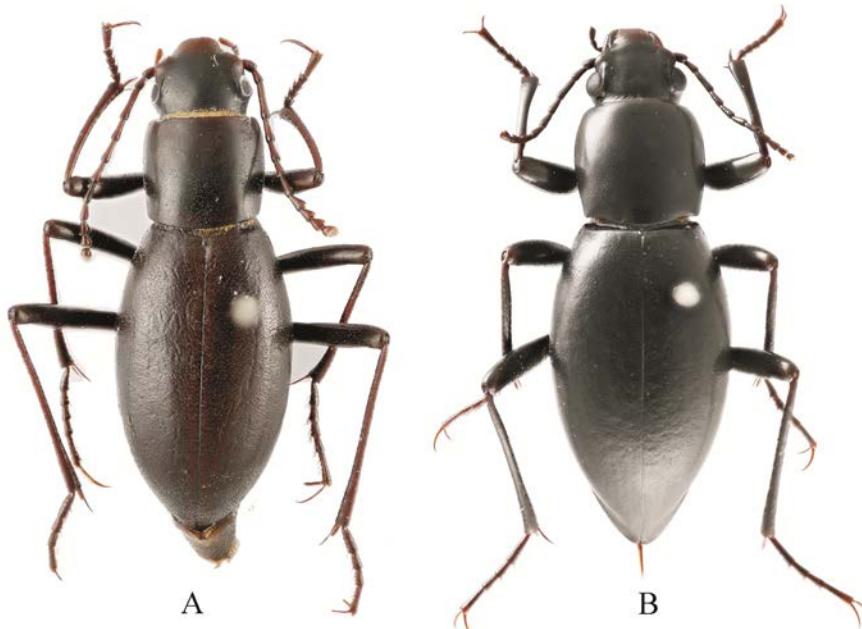


Figure 3. Habitus of the two new species. A. *Anatolica badainica* Ba, Ren & Liu sp. nov.; B. *A. gurbantunggutica* Ba & Ren sp. nov.

Measurements. Body length 13.5–17.0 mm; width 5.5–7.0 mm.

**Holotype.** ♂, China, Xinjiang, Fukang County, Yinshuiqu, 26-V-2006, Yibin BA, Hebei University Museum (white, rectangular, printed). **Paratypes.** 2♀, same label data as holotype; 2♂, China, Xinjiang, Fukang County, Yinshuiqu, 27-V-2010, Qiaozhe LOU, same data as the holotype; 1♂, China, Xinjiang, Cainan Oilfield (Fukang County), 03-VI-2006, Yibin BA, same data as the holotype; 2♂, China, Xinjiang, Qitai County, Shashanzi, 05-IV-2008, Chengli ZHANG & Chunlin LIU, same data as the holotype. All types have additional labels “Holotypus (or Parotypus, respectively), *Anatolica gurbantunggutica* sp. n. Ba & Ren det. 2019” (red and yellow, rectangular, printed and handwritten).

**Etymology.** Named after the type locality, the Gurbantunggut Desert.

**Diagnosis.** This species can be distinguished from *Anatolica dashidorzsi* Kaszab, 1965 as follows: eyes large and slightly raised, strongly convex outward; antennae slender, antennomere IX–XI extending beyond base of pronotum; pronotum smooth, with fine sparse

punctures, space between punctures approximately 4.0–6.0 times of its diameter.

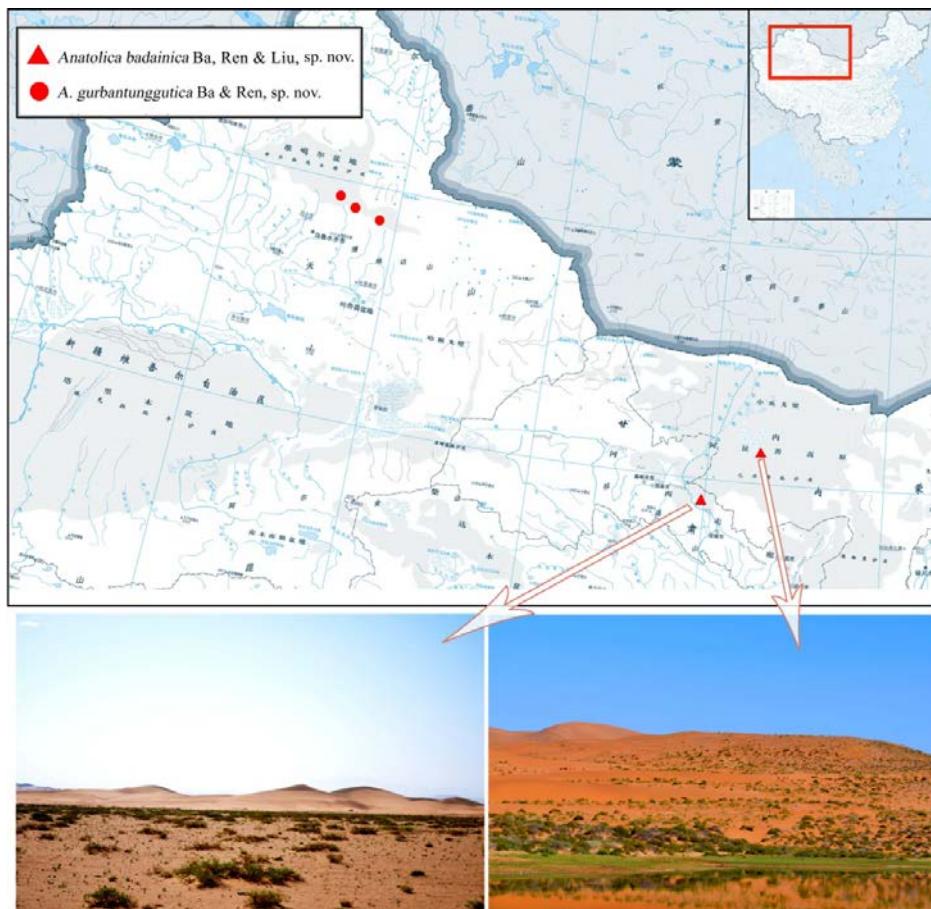


Figure 4. Distribution of the two new species and the habitat of *A. badainica* Ba, Ren & Liu sp. nov.

## Discussion

These two new species seem to be nocturnal, for *A. badainica* could not be found on the ground in the daytime, but was collected by pitfall traps at night; and some specimens of *A. gurbantunggutica* were dug out from sand dunes by Yibin BA. Some other specimens were collected using pitfall traps at night by Qiaozhe LOU (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences).

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